software application execution environment in the transmitter unit **102** including the processes and routines described in conjunction with FIGS. **4-6** and **9**, may be embodied as computer programs developed using an object oriented language that allows the modeling of complex systems with modular objects to create abstractions that are representative of real world, physical objects and their interrelationships. The software required to carry out the inventive process, which may be stored in the memory (not shown) of the transmitter unit **102** may be developed by a person of ordinary skill in the art and may include one or more computer program products.

Various other modifications and alterations in the structure and method of operation of this invention will be apparent to those skilled in the art without departing from the scope and spirit of the invention. Although the invention has been described in connection with specific preferred embodiments, it should be understood that the invention as claimed should not be unduly limited to such specific embodiments. It is intended that the following claims define the scope of the present invention and that structures and methods within the scope of these claims and their equivalents be covered thereby.

What is claimed is:

1. A method of measuring an analyte level, comprising:

applying, using sensor electronics, a control signal to an analyte sensor;

measuring, using the sensor electronics, a response to the control signal applied to the sensor;

determining, using the sensor electronics, an estimated sensor sensitivity based on a variance in the measured response to the control signal applied to the analyte sensor;

calibrating, using the sensor electronics, the analyte sensor using the estimated sensor sensitivity;

receiving, using the sensor electronics, a sensor data signal from the analyte sensor; and

determining, using the sensor electronics, an analyte level based on the received sensor data signal.

2. The method of claim **1**, wherein calibrating the analyte sensor includes applying the control signal that varies over time to the analyte sensor.

3. The method of claim **1**, wherein applying the control signal includes opening and closing the current path to the analyte sensor.

4. The method of claim **1**, wherein the measured response is determined based on determining one of a working electrode current signal, a counter electrode current signal or a reference electrode current signal.

5. The method of claim **1**, wherein the variance in the measured response is determined based on comparing a difference between a beginning of a half duty cycle and an end of the half duty cycle of the measured response to the control signal.

6. The method of claim **1**, wherein the estimated sensor sensitivity is determined using a predetermined relationship between sensor sensitivity and the variance in the measured response.

7. The method of claim **1**, wherein the estimated sensor sensitivity is determined by retrieving a predetermined sensor sensitivity corresponding to the variance in the measured response.

8. The method of claim **1**, further comprising determining if the estimated sensor sensitivity is within a valid range.

9. A system for monitoring analyte concentration, comprising:

an analyte sensor;

a processor operatively coupled to the analyte sensor; and

a memory coupled to the processor, the memory storing processor executable instructions to:

apply a control signal to the analyte sensor;

measure a response to the control signal;

determine an estimated sensor sensitivity based on a variance in the measured response to the control signal applied to the analyte sensor;

calibrate the analyte sensor using the estimated sensor sensitivity;

receive a sensor data signal from the analyte sensor; and

determine an analyte level based on the received sensor data signal.

10. The system of claim **9**, wherein the instructions to calibrate the analyte sensor includes an instruction to apply the control signal that varies over time to the analyte sensor.

11. The system of claim **9**, wherein the instructions to apply the control signal includes an instruction to open and close the current path to the analyte sensor.

12. The system of claim **9**, wherein the variance in the measured response is determined by an instruction to compare a difference between a beginning of a half duty cycle and an end of the half duty cycle of the measured response to the control signal.

13. The system of claim **9**, wherein the estimated sensor sensitivity is determined by an instruction that uses a predetermined relationship between sensor sensitivity and variance in the measured response.

14. The system of claim **9**, wherein the estimated sensor sensitivity is determined by an instruction to retrieve a predetermined sensor sensitivity corresponding to the variance in the measured response.

15. The system of claim **9**, wherein the instructions further include an instruction to determine if the estimated sensor sensitivity is within a valid range.

16. An analyte monitoring system, comprising:

an on-body device including an analyte sensor and sensor electronics operatively coupled to the sensor; and

a receiver operative to receive sensor data from the on-body device;

wherein the sensor electronics is operative to apply a control signal to the analyte sensor, detect a measured response to the control signal, and transmit the measured response and sensor data to the receiver, and

wherein the receiver is operative to determine a variance in the detected measured response, estimate a sensitivity of the analyte sensor based on the variance in the detected measured response, and determine an analyte level based on the received sensor data.

17. The analyte monitoring system of claim **16**, wherein the sensor electronics is configured to vary the level of the control signal over time applied to the sensor.

18. The analyte monitoring system of claim **16**, wherein the sensor electronics is operative to apply the control signal by opening and closing the current path to the analyte sensor.

19. The analyte monitoring system of claim **16**, wherein the receiver being operative to determine the variance in the detected measured response includes the receiver being operative to compare a difference between a beginning and an end of a half duty cycle of the measured response to the control signal.

20. The analyte monitoring system of claim **16**, wherein the receiver being operative to estimate a sensitivity of the sensor includes the receiver being operative to use a predetermined relationship between sensor sensitivity and variance in the measured response.

* * * * *